NATIONAL MUSEUM OF THE UNITED STATES AIR FORCE

MATHEMATICS OF FLIGHT: ALTITUDE AND ATMOSPHERIC PRESSURE

Students will have a basic understanding of math applications used in flight. This includes the relationship of altitude and atmospheric pressure. Students will solve a series of problems. (One in a series)

LESSON PLAN

Grade Level: 6-8

National Mathematics Content Standards:
Algebra: Represent and analyze mathematical situations and structures using algebraic symbols; Use mathematical models to represent and understand quantitative relationships.

Technology Content Standards (from STL):
Technology and Society

Lesson Objectives

The students will:

- Be introduced to formulas used in flight related to navigation and aircraft performance.
- Learn to calculate the changes in atmospheric pressure and altitude.

Goal

In this lesson, students will gain an understanding of common calculations performed by flight personnel.

Altitude and Atmospheric Pressure

Atmospheric pressure decreases approximately 1” Hg (1 inch of mercury) per 1,000 feet of altitude gained. Lowering the altimeter setting lowers the altitude reading. If a pilot makes the following changes to the altimeter setting, what is the approximate change in altitude?

Example:

If the altimeter setting changed from 30.18” to 29.76”, then what is the change in altitude?

Solution:

$30.18” - 29.76” = 0.42”$

$$\frac{1”}{1000’} = \frac{0.42”}{X}$$

$$1” \cdot X = 1{,}000 \cdot 0.42$$

$X = 420$ feet lower

Materials Required:

- Paper
- Pencil or pen

Exercise 1:
Setting changed from 29.25” to 29.85”. What is the approximate change in altitude? (Hint: Notice if an increase or decrease.)

29.25 - 29.85 = 0.60 (increase)

$$\frac{1”}{1000’} = \frac{0.60”}{X}$$

$$1” \cdot X = 1{,}000 \cdot 0.60$$

X = 600 feet higher

Exercise 2:
Setting changed form 30.30” to 29.51”. What is the approximate change in altitude? (Hint: Notice if an increase or decrease.)

30.30” - 29.51” = 0.79 (decrease)

$$\frac{1”}{1000’} = \frac{0.79”}{X}$$

$$1” \cdot X = 1{,}000 \cdot 0.79$$

X = 790 feet lower

Exercise 3:
Setting changed from 30.00” to 29.47”. What is the approximate change in altitude? (Hint: Notice if an increase or decrease.)

30.00” - 29.47” = 0.53 (decrease)

$$\frac{1”}{1000’} = \frac{0.53”}{X}$$

$$1” \cdot X = 1{,}000 \cdot 0.53$$

X = 530 feet lower

See student worksheet and presentation

Resources:

National Museum of the United States Air Force

Belcher, Diana. *Education in Flight: A Teacher’s Guide to the Mathematics of Flight.* Department of the Air Force, 2007.

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STUDENT WORKSHEET *NAME:*_____

$$\frac{\text{1”}}{\text{1000’}} = \frac{\text{Difference}}{\text{X}}$$

(Hint: Notice if an increase or decrease.)

Exercise 1:
Setting changed from 29.25” to 29.85”. What is the approximate change in altitude? (Higher or Lower)

Exercise 2:
Setting changed form 30.30” to 29.51”. What is the approximate change in altitude? (Higher or Lower)

Exercise 3:
Setting changed from 30.00” to 29.47”. What is the approximate change in altitude? (Higher or Lower)